

TOP SECRET

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20 July 1967

MEMORANDUM FOR THE RECORD

SUBJECT: BX6709 INS Data & Plot Analysis

REFERENCE: Conversation 19 July 1967

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I. PLOT AND DATA INDICATIONS:

A. First turn northbound toward Hanoi (Pass #1):

(1) Aircraft overshoot turn something in excess of 13 NM. (INS tape starts after roll-out.) Aircraft was correcting back to planned course at this time 13NM left of course after right turn.

(2) Headings from INS data not consistent for brief period of time. GS and alt look normal.

B. First turn over Hanoi:

(1) Aircraft overshoot turn 10NM right (North) at Chinese border and 16NM right (Northwest) at roll-out of left turn.

(2) Aircraft started slight DS after roll-in. One minute and 20 seconds later, DS rate and GS started increasing. Descent from 80.2M at roll-in to 75.7M approx six minutes later was accompanied by GS increase from 1855 Kts to 1900 Kts. At roll-out aircraft was at 78.9M and GS 1854 Kts.

(3) Initial bank angle at roll-in approx 31° . Less than one minute later bank angle decreased to 23.8° and then increased to 29.3° . This excursion lasted approximately 28 seconds.

C. Turn after first pass over DMZ:

- (1) Bank angle normal throughout.
- (2) Aircraft overshoot 10NM right (Northeast) at roll-out of left turn on leg toward Hanoi (Pass #2).
- (3) GS increased from 1780 Kts at roll-in to 1885 Kts at roll-out.
- (4) Altitude was 75.6 M at roll-in decreasing to 74.1 M one and one-quarter minutes later. At roll-out, alt was 76.2M.

D. Left turn after Hanoi (Pass #2):

- (1) Aircraft undershot turn 4 1/2 NM left of planned true course (South).
- (2) Bank angle normal for first two minutes. Then gradually decreased to 19.3° , and back to normal. This excursion lasted approximately 44 seconds.
- (3) Altitude at roll-in was 79.8M and gradually decreased to 76.1M 4 1/4 minutes after roll-in. At roll-out alt was 76.3M.

II. CONCLUSIONS:

A. Possible autopilot problem; i.e., bank angle and altitude excursions resulting in GS increase. Possible that aircraft flown manually through turns resulting in large excursions.

B. Aircraft possibly flown above optimum altitude causing alt loss to maintain speed.

C. Easterly winds (forecast 090/79) could possibly have caused overshoot on first turn over Hanoi, but on second turn at Hanoi, aircraft undershot turn with slight decrease in GS whereas GS increased on first turn and overshoot resulted. The first turn over Hanoi lasted 8 1/2 minutes. Wind effect using forecast wind should have been about 11NM in Westerly direction. Aircraft at Chinese border was 10NM north of course in this turn which is inconsistent with turn made on second pass where undershoot resulted. Suspect that GS increase and less than normal bank angle are primary causes of turn overshoot.

III. DATA AVAILABILITY:

INS data from SC and DM recorder tape is available at []
Initial computer run of SC & DM tape on PDP-5 computer by []
[] personnel at [] outputs magnetic data
tape which can be listed on 1004 computer. This data output is
identical to that received by Headquarters.

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IV. REQUIREMENTS:

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A. To inform [] how planned track was actually flown by auto nav system on each BLACK SHIELD mission.

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B. To insure [] has copy of mission plot and data for analysis and critique purposes.

C. Hqs requirement to know causes of course deviations for future planning.

D. To advise maintenance of possible equipment malfunctions suspected from indications discovered by INS data analysis.

V. RECOMMENDATIONS:

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A. Requirements A & B in Para IV above are satisfied by availability of INS data at [] for their analysis and conclusion.

B. Requirement for plot can be satisfied by:

(1) Courier delivery of plot from Headquarters.

(2) Installation of facsimile equipment at Hqs and Kadena for direct transmission of chart picture.

(3) Manual plot from INS data by [] personnel.
Recommendation: Manual plot appears to be most timely method. Delivery of chart with mission INS plot by courier would be untimely and could not be applied to maintenance requirement. By the time the plot arrives at [] and issues concerning deviations discussed, all valuable and pertinent data may not be recalled by the pilot and others concerned. Approval for installation of new transmission and receiving equipment is highly unlikely at this time due to phase-out.

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C. Explanation of course deviations on a particular mission should be requested by Hqs with references made to INS data and to specific areas of interest on that mission.

D. Maintenance involvement should be handled at []
Once manual plot is made and pertinent data; i. e., deviations in course, bank angle, altitude and ground speed, is analyzed by personnel at [], possible equipment malfunctions can be identified and discussed with pilot. System repairs/replacement can then be made before next scheduled flight.

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Major, USAF